CONTRIBUTIONS

FROM THE

CUSHMAN LABORATORY

FOR

FORAMINIFERAL RESEARCH

VOLUME 9, PART 1
MARCH 1933

CONTENTS

SHARON, MASSACHUSETTS, U. S. A.
1933

These contributions will be issued quarterly. They will contain short papers with plates, describing new forms and other interesting notes on the general research work on the foraminifera being done on the group by the workers in this laboratory. New literature as it comes to hand will be briefly reviewed.

Subscription $2.50 per year post paid.

Volume 1, parts 1-4, April 1925—January 1926, complete.....$2.50
Volume 2, parts 1-4, April 1926—January 1927, complete.....$2.50
(Owing to the few remaining copies of Volumes 1 and 2, these can be supplied only with orders for complete sets of these Contributions.)

Volume 3, parts 2-4, June—December, 1927..... $2.00
(Volume 3, part 1 now out of print.)
Volume 4, parts 1-4, March—December, 1928, complete..... $2.50
Volume 5, parts 1-4, March—December, 1929, complete..... $2.50
Index to Volumes 1—5 inclusive..... $1.00

Volume 6, parts 1-4, March—December, 1930, complete..... $2.50
Volume 7, parts 1-4, March—December, 1931, complete..... $2.50
Volume 8, parts 1-4, March—December, 1932, complete..... $2.50
(Volume 9 subscription, 1933..... $2.50)

Special publications:

No. 1. Foraminifera, Their Classification and Economic Use. 1928 $5.00
No. 2. A Resumé of New Genera of the Foraminifera Erected Since Early 1928. 1930. ..... .50
No. 3. A Bibliography of American Foraminifera. 1932..... 1.10

Copies of Volume 9, part 1 were first mailed FEBRUARY 2, 1933.

PRESS OF A. H. WILLIS, BRIDGEWATER, MASSACHUSETTS, U. S. A.

CONTRIBUTIONS FROM THE CUSHMAN LABORATORY FOR FORAMINIFERAL RESEARCH

127. NEW FORAMINIFERA FROM THE UPPER JACKSON EOCENE OF THE SOUTHEASTERN COASTAL PLAIN REGION OF THE UNITED STATES*

By JOSEPH A. CUSHMAN

In order that the descriptions and figures of these new species and varieties from the Upper Eocene, Jackson, of the Coastal Plain region of the United States may be available for workers, permission has been granted for their publication. The manuscript has been prepared for a considerable time, and publication will probably be still further delayed. There have been a number of papers published on the foraminifera of the Jackson. From Texas (Cushman and Applin, Bull. Amer. Assoc. Petr. Geol., vol. 10, 1926, pp. 154-189, pls. 5-10), numerous species have been published. From Louisiana (Howe and Wallace, Louisiana Geol. Bull. No. 2, 1932, pp. 1-118, pls. 1-15, 2 text-figs.), a number of new species and varieties, together with figures of other previously described species, have been published. There are also numerous short papers by Cushman and Ellisor and by Cushman in the Contributions from the Cushman Laboratory for Foraminiferal Research giving distributions and figures of numerous new species and varieties from the Jackson of Texas, Mississippi, Alabama, and Florida. This present paper will add to these species, new ones from Mississippi, Alabama, Florida, and North and South Carolina.

Many of these species have a wide range in the American Upper Eocene, and will be recognized by workers, not only from outcrop samples, but also from well borings which penetrate the Jackson of the general Coastal Plain region of the United States. Only the descriptions and short notes are given here. The more

* Published by permission of the Director of the U. S. Geological Survey.

extended detailed distribution will appear with the publication of the large paper of which these descriptions are a part.

GAUDRYINA SUBQUADRATA Cushman, n. sp. (Pl. 1, figs. 1 a-c)

Test elongate, slender, the biserial portion compressed, concave at the broader faces, margins rounded, truncate, early triserial portion greatly reduced; chambers of the biserial portion distinct, 7 or 8 pairs; sutures strongly oblique, slightly depressed; wall arenaceous, exterior somewhat roughened; aperture at the base of the last-formed chamber at the inner edge, small. Length 1.00 mm.; breadth 0.30 mm.; thickness 0.20 mm.

Holotype (U. S. N. M. No. 371526) from Cooper marl, bluff on Biggin Creek, Berkeley Co., S. C.

This is a very elongate, tapering species, the triserial portion being greatly reduced. The broader faces are very distinctly concave.

MILIOLA JACKSONENSIS Cushman, n. sp. (Pl. 1, figs. 2, 3)

Test elongate, elliptical or fusiform, large, quinqueloculine; chambers numerous, distinct, the periphery angled; sutures distinct; wall ornamented with numerous oblique, longitudinal costae, with a single row, occasionally a double one, of coarse rounded pits between each two costae; aperture at the end of a very short neck, cribrate in the adult, in the young with a large number of fine teeth projecting in from the edge. Length 2.00 mm.; diameter 0.55 mm.

Holotype (U. S. N. M. No. 371527) from Jackson formation, Jackson, Miss.

The species occurs in some numbers at Jackson, Miss., in the Upper Eocene. It differs from *M. saxorum* which also occurs at Jackson, in the shape of the chambers and the character of the ornamentation. In some respects it resembles the *Quinqueloculina parisiensis* of d'Orbigny, as figured by Terquem, but Fornasini's tracings of d'Orbigny's original plates show only the longitudinal costae with no signs of punctae.

MASSILINA JACKSONENSIS Cushman, n. sp. (Pl. 1, fig. 4)

Test broadly oval or elliptical, much compressed, periphery subacute, apertural end slightly projecting; early chambers quinqueloculine, later ones in a single plane and *Spiroloculina*-like; sutures distinct, slightly depressed; wall beautifully ornamented by a series of punctae, nearly circular, arranged in longi-

tudinal curved rows parallel to the sutures and also in somewhat definite curved diagonal lines across the chamber; apertural end with a short neck but without a distinct lip. Length 1.40 mm.; breadth 1.00 mm.; thickness 0.20 mm.

Holotype (U. S. N. M. No. 371529) from Jackson formation, Garlands Creek, Miss.

The types of this species are from the Upper Eocene, Jackson, Miss., where it is common. The early stages are occasionally found represented by young individuals, and strongly resemble *Quinqueloculina*. They remotely resemble some of the forms referred by authors to *Q. prisca* d'Orbigny, but they are sharply angled and the numerous specimens show that they are only the young stages of the larger *Massilina*.

MASSILINA JACKSONENSIS Cushman, n. sp., var. PUNCTATO-COSTATA, Cushman, n. var. (Pl. 1, figs. 5, 6)

Variety differing from the typical in the ornamentation of the wall of the test, which has a series of longitudinal, curved costae between the rows of punctae, those near the periphery more strongly developed than nearer the inner portion of the chamber; the neck is more strongly developed than in the typical.

Holotype of variety (U. S. N. M. No. 371530) from Upper Eocene, Jackson, Miss.

ARTICULINA TERQUEMI Cushman, n. sp. (Pl. 1, figs. 7 a-c)

Test small, somewhat larger than broad, compressed, periphery broadly rounded; chambers indistinct except the last two, nearly involute, inflated, ornamented by numerous rounded, longitudinal costae, in general parallel to the periphery, often somewhat uneven, apertural end with a distinct lip; sutures indistinct; wall matte; aperture circular, with a very distinct, slightly flaring lip without a definite tooth. Length 0.25 mm.; breadth 0.13 mm.; thickness 0.07 mm.

Holotype (U. S. N. M. No. 371531) from Jackson formation, Jackson, Miss.

This species somewhat resembles one of the figures given by Terquem as *Articulina gibbosula* d'Orbigny, (Mém. Soc. Géol. France, sér. 3, vol. 2, 1882, pl. 15 [23], fig. 26) from the Eocene of the Paris Basin. It is not the same as d'Orbigny's species of the Miocene of the Vienna Basin, and Terquem's fig. 25 is much more like d'Orbigny's species. On the same plate, fig. 24, referred by Terquem to *Articulina nitida* d'Orbigny, is somewhat similar

but not identical with our form. There is a figure given by Sowerby as "*Triloculina striata* Brown" (Foram. Colne Tidal River, 1856, pl., figs. 5, 6) which also somewhat resembles our specimens, but the costae are not the same and the species is probably a *Massilina*. Our species is somewhat similar to *Articulina byramensis* Cushman, but that species has a very distinctive shape as well as a very different ornamentation.

ROBULUS GUTTICOSTATUS (Gümbel), var. YAZOOENSIS Cushman, n. var. (Pl. 1, fig. 8)

Variety differing from the typical in having a very few beads on the proximal end of the chambers, the distal portion unornamented and depressed, in the adult with the last few sutures entirely without ornamentation and depressed throughout, the keel wanting, and the periphery of each chamber nearly straight, each slightly projecting beyond its immediate predecessor at the angle. Diameter 0.75 mm.

Holotype of variety (U. S. N. M. No. 371532) from Jackson formation, 1½ miles southeast of Melvin, Ala.

ROBULUS ARCUATO-STRIATUS (Hantken), var. CAROLINIANUS Cushman, n. var.
(Pl. 1, figs. 9 a, b)

Test close coiled throughout, strongly umbonate, periphery keeled with a fairly wide thin carina; chambers very distinct, 8 or 9 in the last-formed coil, of uniform shape and increasing very slightly in size as added; sutures distinct, strongly limbate, slightly raised, very strongly curved, ending in the middle in a clear umbo; wall smooth except for the slightly raised sutures; aperture slightly protruding, at the peripheral angle, radiate, apertural face slightly concave, the sides thickened. Diameter 1.30 mm.

Holotype of variety (U. S. N. M. No. 371548) from Ocala limestone, 3¼ miles north of Grove Hill, Ala.

SARACENARIA ARCUATA (d'Orbigny), var. HANTKENI Cushman, n. var.
(Pl. 1, figs. 11, 12)

Cristellaria arcuata HANTKEN (not D'ORBIGNY), A magy kir. földt. int. evkönyve, vol. 4, 1875 (1876), p. 45, pl. 5, figs. 5 *a-c*, 6; Mitth. Jahrb. ungar. geol. Anstalt., vol. 4, 1875 (1881), p. 53, pl. 5, figs. 5 *a-c*, 6.

Test longer than broad, periphery subacute, apertural face truncate, test triangular in transverse section, early portion somewhat close coiled in the first few chambers, soon becoming uncoiled; chambers comparatively few, usually only 7-8, distinct

but not inflated, angles subacute, almost keeled in the last-formed chambers; sutures distinct, very slightly if at all depressed; wall smooth and polished; aperture peripheral, radiate, slightly projecting. Length up to 1.30 mm.; breadth of final chamber 0.50 mm.

Holotype of variety (U. S. N. M. No. 371533) from Cooper marl, Ingleside, S. C.

This is very similar to, if not identical with, the variety figured by Hantken from the Eocene of Hungary, and referred to *Cristellaria arcuata* d'Orbigny. It is usually much more acute than the Miocene species of the Vienna Basin, and the apertural face is much more flattened. The Eocene variety is also straighter, the uncoiled portion being much less strongly curved on both faces, but especially on the inner concave margin.

NODOSARIA LATEJUGATA Gümbel, var. CAROLINENSIS Cushman, n. var. (Pl. 1, fig. 16)

Variety differing from the typical in having the chambers more distinct, and more inflated, the costae similar, but double the number in the typical, and the whole test larger.

Holotype of variety (U. S. N. M. No. 371540) from Cooper marl, Cooper River, S. C.

In the Carolina material this variety seems to be more characteristic than the typical form.

PLANULARIA COOPERENSIS Cushman, n. sp. (Pl. 1, figs. 10 a, b)

Test large, strongly compressed, periphery rounded, not keeled, 15 or more chambers in the final coil, of nearly uniform shape, increasing gradually in size as added; sutures fairly distinct, very slightly limbate, slightly curved, later ones very slightly depressed, earlier ones flush with the surface; wall smooth, matte. Length 4.00 mm.; breadth 3.00 mm.; thickness 0.40 mm.

Holotype (U. S. N. M. No. 371534) from Cooper marl, Highway No. 17, ¾ mile west of Old Biggin Church, Berkeley Co., S. C.

This is a fine large species of the general form usually assigned to "*Cristellaria cassis* (Fichtel and Moll)" which is, however, a very different species. The Eocene species has no keel, and the wall is entirely smooth.

MARGINULINA COOPERI Cushman, n. sp. (Pl. 1, fig. 13)

Test of medium size, the earlier chambers close coiled, later ones becoming uncoiled, periphery broadly rounded, without a keel but with 2 or 3 short, stout spines at the curve of the test, one

EXPLANATION OF PLATE 1

FIGS. 1 *a–c.* *Gaudryina subquadrata* Cushman, n. sp. × 35. *a*, front view; *b*, side view; *c*, apertural view.

FIGS. 2, 3. *Miliola jacksonensis* Cushman, n. sp. × 20. Fig. 2, Holotype. Fig. 3, Paratype.

FIG. 4. *Massilina jacksonensis* Cushman, n. sp. × 20.

FIGS. 5, 6. *Massilina jacksonensis* Cushman, n. sp., var. *punctato-costata* Cushman, n. var. × 20. Fig. 5, Paratype. Fig. 6, Holotype.

FIGS. 7 *a–c.* *Articulina terquemi* Cushman, n. sp. × 50. *a*, *b*, opposite sides; *c*, apertural view.

FIG. 8. *Robulus gutticostatus* (Gümbel), var. *yazooensis* Cushman, n. var. × 25.

FIGS. 9 *a*, *b*. *Robulus arcuato-striatus* (Hantken), var. *carolinianus* Cushman, n. var. × 20. *a*, side view; *b*, peripheral view.

FIGS. 10 *a*, *b*. *Planularia cooperensis* Cushman, n. sp. × 10. *a*, side view; *b*, peripheral view.

FIGS. 11, 12. *Saracenaria arcuata* (d'Orbigny), var. *hantkeni* Cushman, n. var. × 30. Fig. 11, Paratype. Fig. 12, Holotype.

FIG. 13. *Marginulina cooperi* Cushman, n. sp. × 20.

FIGS. 14, 15. *Marginulina cooperensis* Cushman, n. sp. × 25. Fig. 14, Paratype, Megalospheric form. Fig. 15, Holotype, Microspheric form.

FIG. 16. *Nodosaria latejugata* Gümbel, var. *carolinensis* Cushman, n. var. × 20.

FIG. 17. *Dentalina cooperensis* Cushman, n. sp. × 35.

FIGS. 18, 19. *Dentalina hantkeni* Cushman, n. sp. × 35. Fig. 18, Paratype. Fig. 19, Holotype.

FIG. 20. *Dentalina halkyardi* Cushman, n. sp. × 35.

FIG. 21. *Nodosaria cookei* Cushman, n. sp. × 35.

FIG. 22. *Lagena orbignyana* (Seguenza), var. *semiconcentrica* Cushman, n. var. × 35.

FIGS. 23 *a–c.* *Nonionella jacksonensis* Cushman, n. sp. × 45. *a*, dorsal view; *b*, ventral view; *c*, apertural view.

FIGS. 24 *a*, *b*. *Spiroplectoides curta* Cushman, n. sp. × 100. *a*, side view; *b*, peripheral view.

FIG. 25. *Reussia eocena* Cushman, n. sp. × 35.

FIG. 26. *Plectofrondicularia cookei* Cushman, n. sp. × 35.

FIG. 27. *Nodogenerina cooperensis* Cushman, n. sp. × 45.

FIG. 28. *Uvigerina glabrans* Cushman, n. sp. × 35.

FIG. 29. *Uvigerina yazooensis* Cushman, n. sp. × 35.

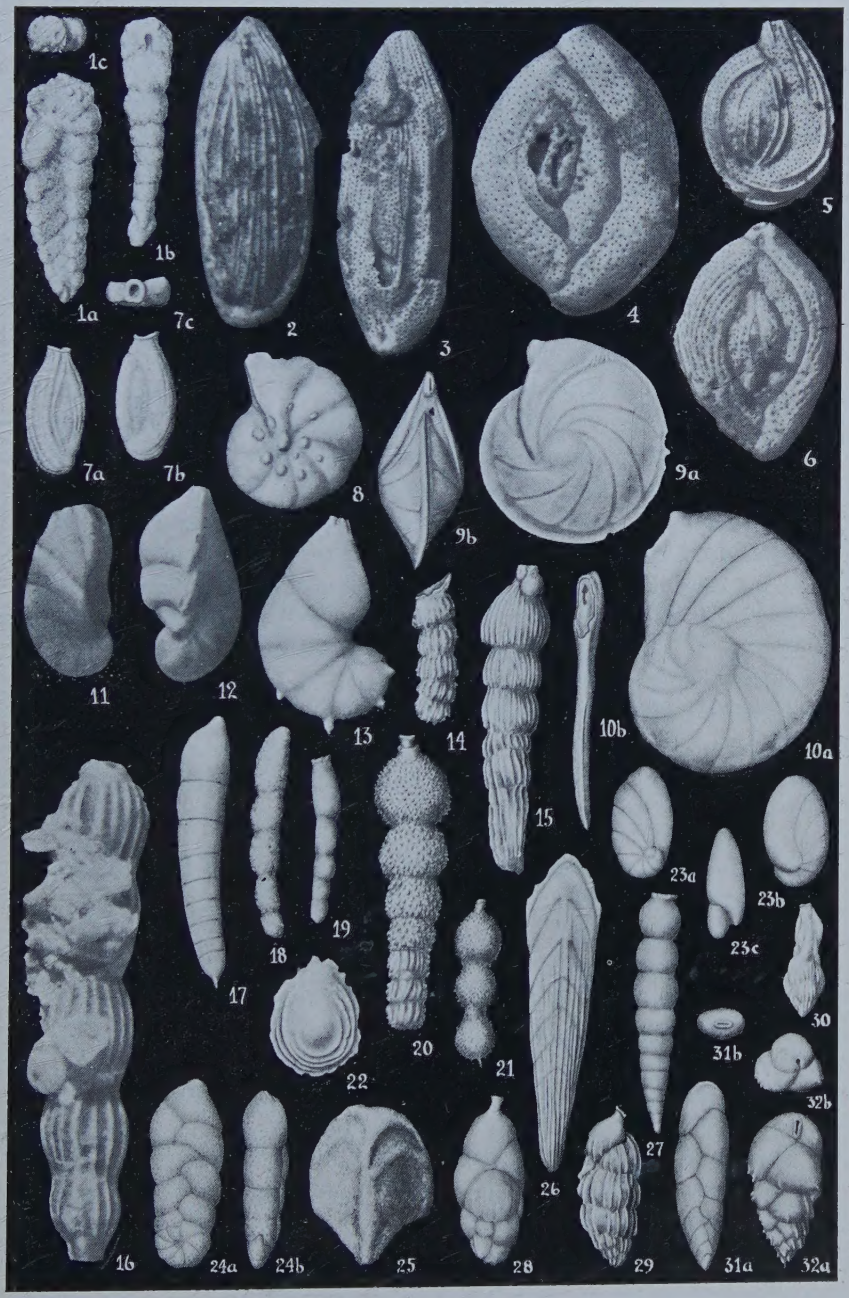
FIG. 30. *Angulogerina ocalana* Cushman, n. sp. × 35.

FIGS. 31 *a*, *b*. *Virgulina recta* Cushman, n. sp. × 45. *a*, front view; *b*, apertural view.

FIGS. 32 *a*, *b*. *Bulimina cooperensis* Cushman, n. sp. × 45. *a*, side view; *b*, apertural view.

Figures 2–6, 11, 12, and 16 from photographs.

Other figures drawn by Margaret S. Moore.


1c
1b
1a
7c
2
3
4
5
7a
7b
8
9b
9a
6
11
12
13
14
15
10b
10a
23a
23b
23c
18
19
17
20
21
22
30
31b
32b
27
26
16
24a
24b
25
28
29
31a
32a

to a chamber; chambers distinct, about six in a volution in the earlier part, not inflated, entirely involute, in the later uncoiled part with more inflated chambers; sutures very distinct, not depressed, slightly limbate; aperture peripheral throughout, rather large, radiate. Length 1.50 mm.

Holotype (U. S. N. M. No. 371536) from Cooper marl, Cooper River, S. C.

This is a very distinct species in the American Eocene. It perhaps most closely resembles *M. hauerina* (d'Orbigny) and *M. alazanensis* (Cushman), but is distinct in many of its characters.

MARGINULINA COOPERENSIS Cushman, n. sp. (Pl. 1, figs. 14, 15)

Test elongate, tapering, the early portion much compressed, later portion circular in transverse section; chambers distinct, earlier ones forming part of a coil, last 3 or 4 subglobular; sutures somewhat hidden by the ornamentation which is composed of longitudinal costae, numerous, about 15-18 on the visible half of the last chamber, becoming somewhat produced at the proximal margin of each chamber; aperture terminal, with a definite cylindrical neck and thickened lip. Length 1.40 mm.; maximum breadth 0.35 mm.

Holotype (U. S. N. M. No. 371537) from Cooper marl, Cooper River, S. C.

DENTALINA COOPERENSIS Cushman, n. sp. (Pl. 1, fig. 17)

Test elongate, slightly compressed, very slightly tapering, gently curved, periphery only slightly sinuate, apical end pointed or with a single small spine; chambers few, usually about ten in the adult specimen, often indistinct; sutures fairly distinct, oblique; wall smooth, matte; aperture at the periphery of the chamber, slightly projecting. Length 2.00-2.50 mm.; breadth 0.30 mm.

Holotype (U. S. N. M. No. 371538) from Cooper marl, Cooper River, S. C.

This species is allied to some of the forms referred to *Nodosaria communis* d'Orbigny, but in the Upper Eocene of the Coastal Plain region, seems to be distinct. The margins are nearly entire, only slightly sinuous, occasionally near the apertural end; the sutures are distinctly oblique, and the number of chambers usually not more than ten.

DENTALINA HANTKENI Cushman, n. sp. (Pl. 1, figs. 18, 19)

Test elongate, arcuate, somewhat compressed, composed of a few chambers, initial end rounded; chambers distinct, increasing in length as added, outer curve sinuate, inner curve nearly uniform; sutures fairly distinct, somewhat oblique; aperture near the inner curve with a slightly produced neck. Length 1.25 mm.; greatest diameter 0.15 mm.

Holotype (U. S. N. M. No. 371539) from Ocala limestone, 3½ miles northeast of Brooklyn, Ala.

Hantken's figure and description of *Dentalina büdensis* are somewhat similar to this species from the Upper Eocene.

DENTALINA HALKYARDI Cushman, n. sp. (Pl. 1, fig. 20)

Nodosaria (*Dentalina*) *spinulosa* HALKYARD (not MONTAGU), Mem. Proc. Manchester Lit. Philos. Soc., vol. 62, 1917-1918 (1919), p. 79.

Test elongate, tapering, initial end rounded, composed of a few chambers, seven in the type specimen, globular, the earlier ones more overlapping than the later ones; sutures distinct and depressed; wall ornamented in the earliest chambers by longitudinal costae, about 7 or 8 visible on each side of the chambers, the proximal end of each costa somewhat projecting, in the next-formed chambers the costae are broken into short bits which become spinose at the proximal end, and in the last-formed chambers the ornamentation consists of a series of fine, almost hispid spines in longitudinal lines; apertural end with a cylindrical neck and a thickened lip, the neck with annular corrugations and the outer border with a series of teeth. Length 1.40 mm. or more; breadth of last-formed chamber 0.30-0.40 mm.

Holotype from Jackson formation, Cooper River, S. C.

From the description given by Halkyard in the reference above, this is the same as his material from the Upper Eocene, Blue marl of Coté des Basques, Biarritz. His description is as follows: "The earlier chambers of the shells are invariably ornamented with longitudinal costae, which later are interrupted or broken up into short lengths, and later still, into spines or prickles pointing backwards. The prickles first make their appearance on the basal portion of each segment."

NODOSARIA COOKEI Cushman, n. sp. (Pl. 1, fig. 21)

Test small, composed of few chambers, well separated from one another, chambers very distinct, slightly longer than wide, circular in diameter; sutures indistinct; wall covered by very fine

hispid spines, both on the body of the chambers, and on the connections; aperture at the end of an elongate, cylindrical neck. Length 0.75 mm.; diameter 0.25 mm.

Holotype (U. S. N. M. No. 371541) from Ocala limestone, Covington Co., Ala.

This seems to be identical with a species figured without name by von Schlicht (Foram. Pietzpuhl, 1870, pl. 6, fig. 28) and apparently not named by Reuss.

The newly added chamber is set onto the neck of the preceding one near the apertural end, and a long narrow connection is thus left between adjacent chambers. The surface ornamentation is very delicate. It resembles somewhat *N. conspurcata* Reuss, but has a finer ornamentation and the chambers are more remote.

LAGENA ORBIGNYANA (Seguenza), var. SEMICONCENTRICA Cushman, n. var.
(Pl. 1, fig. 22)

This variety differs from var. *concentrica* Sidebottom in having the central part of the faces of the test without ornamentation. There are numerous concentric ridges at the sides, but they are slightly interrupted at the base, and are wanting in the center. Length 0.45 mm.

Holotype of variety (U. S. N. M. No. 371542) from Castle Hayne marl, Wilmington, N. C.

NONIONELLA JACKSONENSIS Cushman, n. sp. (Pl. 1, figs. 23 a-c)

Test longer than broad, periphery rounded, ventral side involute and the chambers extending over the umbilical region, dorsal side with the chambers ending at the umbilical region; chambers distinct, about eight in the final whorl, becoming increasingly elongate in the adult, the inner end of the final chamber extending across the umbilical area nearly to the periphery on the ventral side, inflated; sutures distinct, slightly if at all depressed; wall smooth, finely perforate; aperture peripheral, at the base of the apertural face, low. Length 0.80 mm.; breadth 0.50 mm.; thickness 0.30 mm.

Holotype from Jackson formation at Claiborne, Ala.

This species resembles some of the forms often assigned to *Nonionella turgida* (Williamson), but the general shape is different, and the chambers of our species are broader and usually fewer.

SPIROPLECTOIDES CURTA Cushman, n. sp. (Pl. 1, figs. 24 a, b)

Test minute, about three times as long as broad, only slightly compressed in the later biserial portion, early planispiral portion much compressed, sides of the test nearly parallel; chambers distinct, slightly inflated, usually four pairs in the biserial portion, periphery in the later chambers broadly rounded; sutures distinct, very slightly if at all depressed, nearly at right angles to the periphery; wall distinctly perforate, otherwise smooth; aperture narrow on the terminal face, median. Length 0.25 mm.; breadth 0.10 mm.; thickness 0.06 mm.

Holotype (U. S. N. M. No. 371543) from Cooper marl, 1 mile south of Moncks Corner, Berkeley Co., S. C.

This is a very short, stout species of this genus, and evidently has a restricted range. The planispiral early portion consists of about a single complete coil, and the chambers show best when the specimen is wet.

PLECTOFRONDICULARIA COOKEI Cushman, n. sp. (Pl. 1, fig. 26)

Test elongate, tapering, much compressed, slightly keeled, early chambers biserial, later ones uniserial; chambers distinct, especially the later ones, earlier ones somewhat obscured by the ornamentation of the wall, the uniserial ones extending back farther and farther at the sides as added; sutures of the later portion distinct, and slightly depressed, somewhat limbate throughout; wall of the earlier one-third or one-half ornamented by very distinct, sharp, longitudinal costae, as many as fifteen in some specimens, later portion of the test smooth; aperture elliptical, terminal. Length up to 2.00 mm.; diameter 0.15-0.25 mm.

Holotype from Cooper marl, Cooper River, S. C.

This species resembles some of those described by Reuss and by Karrer from the Miocene and Oligocene of Europe and the Philippines, but is different from any of these. It is often abundant in the Cooper marl, but was not found in the other Jackson material examined. The biserial chambers can only be observed when the specimen is wet or mounted in balsam or other transparent media. Specimens sometimes become much wider than shown in the figures.

NODOGENERINA COOPERENSIS Cushman, n. sp. (Pl. 1, fig. 27)

Test small, slender, tapering, final chamber usually the largest, but occasionally reduced somewhat in size, uniserial throughout, or the initial end showing traces of a triserial arrangement;

chambers distinct, subglobular or slightly pyriform, the greatest diameter slightly below the middle; sutures distinct, much depressed; wall very finely spinose; aperture terminal, circular, with a very short neck and distinct but narrow lip. Length 0.55 mm.; diameter 0.10 mm.

Holotype from Cooper marl, 1 mile south of Moncks Corner, Berkeley Co., S. C.

This is a small, but distinctive species, with a finely spinose surface. The basal portion of the chamber is not cut under as distinctly as in some of the species of the genus, and the neck is very short.

BULIMINA COOPERENSIS Cushman, n. sp. (Pl. 1, figs. 32 a, b)

Test elongate, tapering, 2½-3 times as long as wide, greatest breadth toward the apertural end; chambers distinct, inflated, considerably overlapping; sutures deep, distinct; wall of the basal half of the chambers with plate-like costae ending in sharp points, the initial end of the test often with a spine; aperture elongate, with a slightly depressed border. Length 0.40-0.50 mm.; breadth 0.18-0.20 mm.

Holotype from Cooper marl, 1 mile south of Moncks Corner, Berkeley Co., S. C.

This belongs in the general group of *Bulimina inflata*, but is quite different from the typical form of that species in the Pliocene of Italy.

VIRGULINA RECTA Cushman, n. sp. (Pl. 1, figs. 31 a, b)

Virgulina sp(?), CUSHMAN, Prof. Paper 129-E, U. S. Geol. Survey, 1922, p. 92, pl. 16, figs. 2, 3.

Test elongate, not much compressed, tapering at the initial end, sides for the remainder of the test nearly parallel, apertural end broadly truncate; chambers distinct, high, six biserial ones making up the larger part of the test; sutures distinct, slightly depressed, nearly at right angles to the periphery; wall smooth; aperture rather broad, and large for the genus. Length 0.55 mm.; breadth 0.15 mm.; thickness 0.10 mm.

Holotype (U. S. N. M. No. 371544) from Cooper marl, 1 mile south of Moncks Corner, Berkeley Co., S. C.

This is the same as the species figured without name from the Byram marl of Mississippi. It resembles somewhat *Virgulina mexicana* Cole from the Guayabal formation of Mexico, but specimens of that species examined show a smaller, much more delicate and more compressed species.

REUSSIA EOCENA Cushman, n. sp. (Pl. 1, fig. 25)

Test short and broad, pyramidal, three-sided, widest above the middle, triangular in transverse section, the sides in the adult deeply concave, in the young stages nearly flat; angles in the young sharp, in the adult becoming thick and rounded; surface smooth; aperture at the inner border of the last-formed chamber. Maximum length 0.80 mm.

Holotype (U. S. N. M. No. 371545) from Ocala limestone, Pineola, Fla.

This species differs from the two common Vicksburg species, *Reussia rectimargo* Cushman and *R. spinulosa* Reuss, var. *glabrata* Cushman, in the short broad form, and especially the much deeper concavity of the sides and the rounded angles. It seems to be most abundant in the shallower water phase such as is represented by the Ocala limestone. In its very early stages the sides are flat, and suggest *Verneuilina spinulosa* Reuss; later it assumes the form of var. *glabrata* Cushman, but in its adult characters becomes very broad with deeply concave sides. The early stages might easily be confused with the other forms mentioned, but the adult is distinctive.

UVIGERINA GLABRANS Cushman, n. sp. (Pl. 1, fig. 28)

Test of medium size for the genus, elongated, subcylindrical, or slightly fusiform, greatest width usually below the middle, periphery only very slightly lobulate; chambers comparatively few, inflated, evenly rounded; sutures very slightly depressed; wall smooth, or with faint traces of costae near the initial end, finely perforate; apertural end truncate, with a short, delicate, cylindrical neck and phialine lip, the neck often broken. Maximum length 0.75 mm.; width 0.30-0.35 mm.

Holotype (U. S. N. M. No. 371547) from Jackson formation, 3½ miles southeast of Cullomburg, Ala.

This is the only smooth species of the Coastal Plain Upper Eocene. It is related to *U. cocoaensis*, and is usually found associated with that species, but fewer in number. It is also related to certain of the living species of the western Atlantic, usually referred to *U. canariensis* d'Orbigny.

UVIGERINA YAZOOENSIS Cushman, n. sp. (Pl. 1, fig. 29)

Test small, elongate, fusiform, greatest width toward the apertural end, periphery strongly lobulate; chambers numerous, inflated; sutures strongly depressed, the basal portion of the cham-

ber overhanging the preceding ones; wall ornamented with sharp, longitudinal costae, limited to the individual chamber, those of preceding and succeeding chambers not usually in the same line, the outer edge of the costae often serrate, about 22-26 costae in the complete circumference in the widest region; wall rather coarsely perforate; apertural end with a short, narrow, cylindrical neck, and phialine lip. Maximum length 0.70 mm.; width 0.28 mm.

Holotype (U. S. N. M. No. 371549) from Jackson formation, ½ mile southeast of Melvin, Ala.

This species is distinct from the others of the Upper Eocene of the Coastal Plain in the sharp costae, limited to the individual chambers, and the very deeply indented sutural regions, making a very lobulate periphery. There is apparently no tendency for the costae to become obsolete in the last-formed chambers. *Uvigerina yazooensis* is apparently the direct ancestral form of some of the species now living in the eastern Atlantic, especially *U. peregrina* Cushman.

ANGULOGERINA OCALANA Cushman, n. sp. (Pl. 1, fig. 30)

Test small for the genus, elongated, fusiform, periphery very slightly lobulate, somewhat triangular in section, the angles rounded, especially in the early portion; wall ornamented with numerous, very fine, slightly raised costae, the outer edge broken into a finely serrate line; apertural end with the chambers somewhat loosely arranged, the costae less prominent or nearly wanting, the chambers more definitely triangular, angles sharper; apertural end extended into a short neck with a slight lip. Maximum length 0.35 mm.; width 0.15 mm.

Holotype (U. S. N. M. No. 371550) from Upper Eocene, Spring Mill Creek, Jenkins Co., Ga.

This is probably the ancestral form of *A. byramensis* Cushman so abundant in the Byram marl of the Lower Oligocene, and these are again ancestral forms of the Miocene and living *A. occidentalis* Cushman of the shallow water of the Florida region.

DISCORBIS GLOBULO-SPINOSA Cushman, n. sp. (Pl. 2, figs. 1 a-c)

Test comparatively small, plano-convex, the ventral side flattened or even slightly concave, dorsal side unevenly convex, periphery with a blunt keel; chambers distinct, especially on the ventral side, with usually five chambers in the last-formed whorl, of uniform shape, increasing slightly in size as added; sutures

distinct, on the dorsal side in the earlier chambers nearly radial, only slightly curved, becoming more and more oblique as chambers are added, not depressed, on the ventral side nearly radial, only slightly curved toward the periphery, slightly depressed; wall finely but distinctly perforate, the ventral side smooth, dorsal side with a series of spines, one or more from each chamber; aperture a curved, arched opening, on the ventral side of the last-formed chamber, midway between the periphery and the umbilical region. Diameter 0.30 mm.; thickness 0.12 mm.

Holotype (U. S. N. M. No. 371553) from Upper Eocene, Jackson, Miss.

This is a very distinctly ornamented, small species which is characteristic of this Upper Eocene as developed at Jackson and other localities of equivalent age.

DISCORBIS OCALANA Cushman, n. sp. (Pl. 2, figs. 5 a-c)

Test biconvex, dorsal side slightly more convex than the ventral, which is slightly umbilicate, periphery rounded; chambers usually five in the adult whorl, those of the last whorl distinct, earlier ones obscure, gradually increasing in size as added, slightly inflated; sutures gently curved dorsally, ventrally nearly radial, slightly depressed on both sides; wall thick, smooth; aperture ventral, toward the umbilicus. Diameter 0.60 mm.; height 0.20 mm.

Holotype (U. S. N. M. No. 371555) from Ocala limestone, Marianna, Florida.

This is a thick-walled species which occurs in the Ocala limestone, but is not usually well preserved, as is the case with numerous other species of this formation.

DISCORBIS ASSULATA Cushman, n. sp. (Pl. 2, figs. 2 a-c)

Test very much compressed, plano-convex, ventral side flat or concave, dorsal side very slightly convex, periphery subacute, slightly keeled; chambers usually six in the final whorl, of uniform shape but increasing rather rapidly in size as added; sutures distinct, limbate, about evenly curved on the dorsal and ventral sides, the later one or two on the ventral side with a lip-like projection; wall smooth, finely perforate; aperture ventral, toward the umbilicus, beneath a slightly overhanging lip. Diameter 0.50 mm.; height 0.10 mm.

Holotype (U. S. N. M. No. 371556) from Ocala limestone, 2 miles south of Perry, Ga.

This is a very thin, scale-like species, with distinctly limbate sutures, which are evenly curved on the two sides.

DISCORBIS ALABAMENSIS Cushman, n. sp. (Pl. 2, figs. 3 a-c)

Test small, unequally biconvex, ventral side slightly convex, dorsal side more strongly so, periphery rounded; chambers distinct, usually about six in the final whorl, slightly inflated, of uniform shape, increasing very slightly in size as added, on the ventral side with the inner end of the chambers lobed; sutures distinct, slightly depressed, gently curved; wall smooth; aperture near the umbilicus, with a slight overhanging lip. Diameter 0.25 mm.; height 0.06 mm.

Holotype (U. S. N. M. No. 371557) from Ocala limestone, Beck, Ala.

This is a very small but distinct species especially when seen from the ventral side.

DISCORBIS ALVEATA Cushman, n. sp. (Pl. 2, figs. 4 a-c)

Test plano-convex, dorsal side raised in a low spire, ventral side nearly flat, periphery acute and slightly keeled; chambers distinct, about five in the adult whorl, of uniform shape, increasing gradually in size as added, the ventral side with the inner portion broken up into a series of channels, radiating from the umbilicus; sutures distinct, slightly limbate on the dorsal side, strongly curved, flush with the surface, on the ventral side nearly radial, slightly curved and distinctly depressed; wall smooth, except for the channelling of the umbilical area on the ventral side; aperture narrow, at the umbilical end of the chamber. Diameter 0.35 mm.; height 0.12 mm.

Holotype (U. S. N. M. No. 371558) from Jackson formation, Garlands Creek, Miss.

This is a small, distinctive species of few chambers, one of the main characteristics being the channelling of the ventral side.

DISCORBIS BULLA Cushman, n. sp. (Pl. 2, figs. 6 a-c)

Test much compressed except at the umbo which is distinctly elevated, ventral side convex, but umbilicate, periphery acute; chambers few, much elongate, narrow, strongly curved, three completing a whorl, the last-formed one making up more than half the periphery; sutures distinct, very strongly curved on the

dorsal side, somewhat limbate, ventrally slightly depressed, curved; wall on the dorsal side, smooth, ventrally with traces of radial markings; aperture opening into the umbilical area. Diameter 0.50-0.60 mm.; height 0.15-0.18 mm.

Holotype (U. S. N. M. No. 371554) from Ocala limestone, Pea River, at Geneva, Ala.

This is a peculiarly shaped species with a very prominent umbo, convex ventral side, and very long, curved chambers. It belongs in the group usually assigned to *Discorbis orbicularis* (Terquem).

EPONIDES OCALANA Cushman, n. sp. (Pl. 2, figs. 7 a-c)

Test comparatively large, strongly plano-convex, periphery rounded, dorsal side flat, ventral side very convex; chambers 5 or 6 in the last-formed whorl, distinct; sutures on the dorsal side curved, limbate, raised above the surface, and often connecting with a raised ridge about the periphery, on the ventral side slightly depressed, very slightly curved, ending in the rather large, umbilical cavity; wall thick, matte; aperture a short, semi-elliptical opening, near the umbilical end of the ventral margin of the chamber. Length 1.00-1.25 mm.; breadth 0.75-0.85 mm.; thickness 0.50-0.60 mm.

Holotype (U. S. N. M. No. 371561) from Ocala limestone, Covington Co., Ala.

EPONIDES MINIMA Cushman, n. sp. (Pl. 2, figs. 8 a-c)

Test small, trochoid, spine low, periphery bluntly keeled, lobulated; chambers typically 6-7 in the adult whorl, of uniform shape, gradually increasing in size as added; sutures on the dorsal side obliquely curved, slightly limbate, flush with the surface, ventrally somewhat curved, slightly depressed; wall smooth dorsally, on the ventral side with papillae somewhat obscuring the sutures over the umbilical portion; aperture ventral, between the periphery and the umbilical area. Diameter 0.25 mm.; height 0.12 mm.

Holotype (U. S. N. M. No. 371564) from Cooper marl, Highway No. 17, ¾ mile west of Old Biggin Church, Berkeley Co., S. C.

This is a very small species, probably nearest to the Recent *Eponides exigua* (H. B. Brady), but differing from that species in the sutures of the dorsal side, which, in Brady's species, are strongly limbate, especially the spiral suture, and in the ventral side, which is smooth in Brady's species, and in ours is very markedly papillate.

VALVULINERIA JACKSONENSIS Cushman, n. sp. (Pl. 2, figs. 9 a-c)

Test biconvex, compressed, dorsal side with a very low spire, ventrally convex toward the periphery but depressed at the umbilicus, which is somewhat finely papillate, periphery rounded; chambers distinct, about eight in the adult whorl, of uniform shape, gradually increasing in size as added, not inflated; sutures distinct, on the dorsal side gently curved, limbate, not depressed, ventrally nearly straight, oblique, very slightly depressed; wall smooth; aperture ventral, beneath the umbilical lobe of the last-formed chamber. Length 0.50 mm.; breadth 0.35 mm.; thickness 0.15 mm.

Holotype (U. S. N. M. No. 371559) from Ocala limestone, 3½ miles northeast of Brooklyn, Ala.

This is a characteristic species, occurring at numerous stations,

---

EXPLANATION OF PLATE 2

FIGS. 1 *a–c.* *Discorbis globulo-spinosa* Cushman, n. sp. × 60. *a*, dorsal view; *b*, ventral view; *c*, peripheral view.

FIGS. 2 *a–c.* *Discorbis assulata* Cushman, n. sp. × 45. *a*, dorsal view; *b*, ventral view; *c*, peripheral view.

FIGS. 3 *a–c.* *Discorbis alabamensis* Cushman, n. sp. × 45. *a*, dorsal view; *b*, ventral view; *c*, peripheral view.

FIGS. 4 *a–c.* *Discorbis alveata* Cushman, n. sp. × 45. *a*, dorsal view; *b*, ventral view; *c*, peripheral view.

FIGS. 5 *a–c.* *Discorbis ocalana* Cushman, n. sp. × 45. *a*, dorsal view; *b*, ventral view; *c*, peripheral view.

FIGS. 6 *a–c.* *Discorbis bulla* Cushman, n. sp. × 45. *a*, dorsal view; *b*, ventral view; *c*, peripheral view.

FIGS. 7 *a–c.* *Eponides ocalana* Cushman, n. sp. × 25. *a*, dorsal view; *b*, ventral view; *c*, peripheral view.

FIGS. 8 *a–c.* *Eponides minima* Cushman, n. sp. × 45. *a*, dorsal view; *b*, ventral view; *c*, peripheral view.

FIGS. 9 *a–c.* *Valvulineria jacksonensis* Cushman, n. sp. × 45. *a*, dorsal view; *b*, ventral view; *c*, peripheral view.

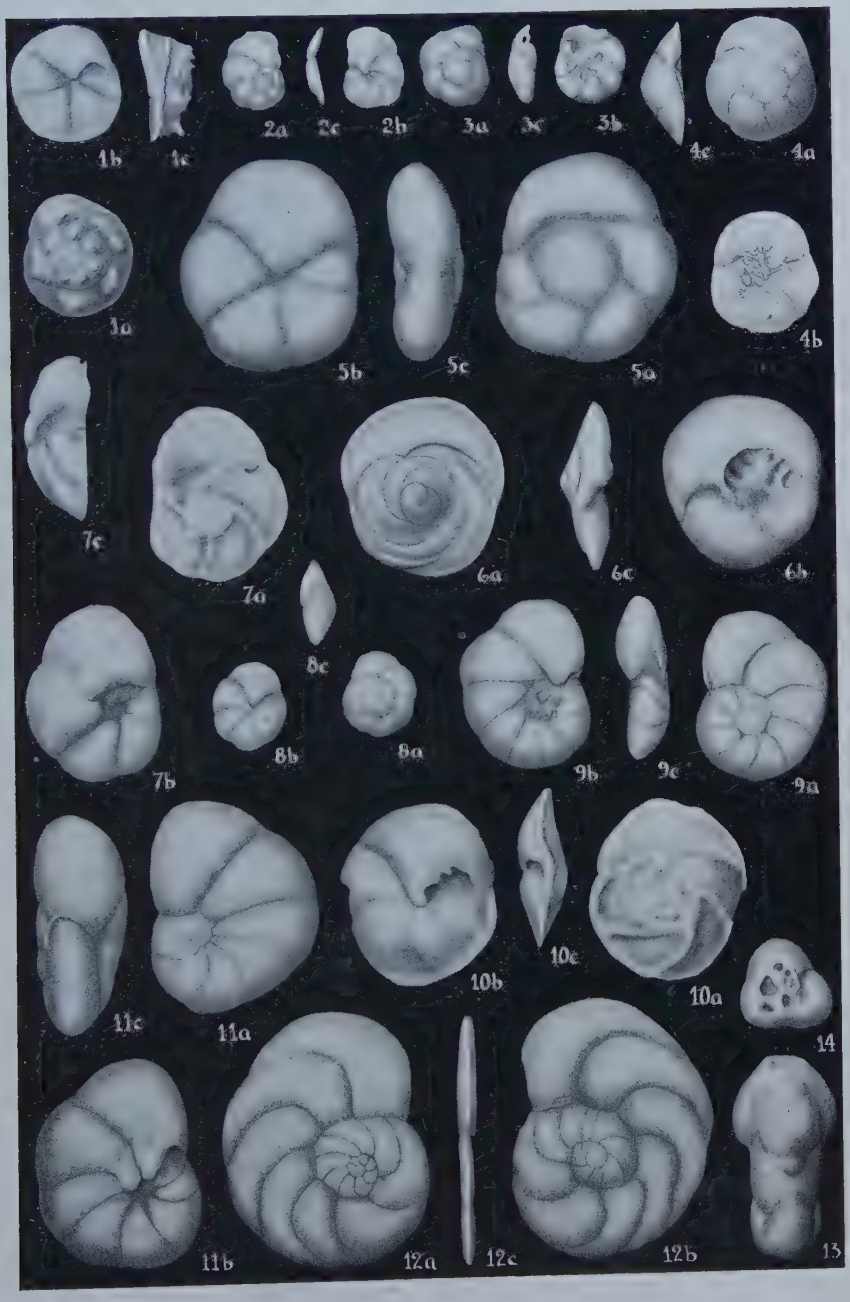
FIGS. 10 *a–c.* *Lamarckina jacksonensis* Cushman, n. sp. × 45. *a*, dorsal view; *b*, ventral view; *c*, peripheral view.

FIGS. 11 *a–c.* *Cibicides cooperensis* Cushman, n. sp. × 35. *a*, dorsal view; *b*, ventral view; *c*, peripheral view.

FIGS. 12 *a–c.* *Planulina cocoaensis* Cushman, var. *cooperensis* Cushman, n. var. × 25. *a*, dorsal view; *b*, ventral view; *c*, peripheral view.

FIGS. 13, 14. *Rupertia* (?) *floridana* Cushman, n. sp. × 10. Fig. 13, Holotype, side view. Fig. 14, Paratype, apertural view.

Figures drawn by Margaret S. Moore.


1b
1c
2a
2c
2b
3a
3c
3b
4c
4a
1a
5b
5c
5a
4b
7c
7a
6a
6c
6b
8c
8b
8a
7b
9b
9c
9a
11c
11a
10b
10c
10a
14
11b
12a
12c
12b
13

but the preservation of the material does not always allow certain determination.

LAMARCKINA JACKSONENSIS Cushman, n. sp. (Pl. 2, figs. 10 a-c)

Test about equally biconvex, periphery acute, slightly keeled; chambers about five in the adult whorl, rapidly increasing in size as added, ventrally somewhat inflated; sutures on the dorsal side, slightly curved, very oblique, limbate, and raised, on the ventral side, curved, either flush with the surface or slightly depressed; walls smooth, except for the raised sutures on the dorsal side, on the ventral side, smooth and polished; aperture a large opening in a deep re-entrant of the ventral side. Length 0.45-0.50 mm.; breadth 0.35-0.40 mm.; thickness 0.15 mm.

Holotype (U. S. N. M. No. 371571) from Ocala limestone, west bank of Pea River, Geneva Co., Ala.

This species is most closely related in the shape of its chambers to *Lamarckina ocalana* Cushman, but differs from that species in the much more oblique sutures, the fewer chambers, and less convex form.

PLANULINA COCOAENSIS Cushman, var. COOPERENSIS Cushman, n. var. (Pl. 2, figs. 12 a-c)

Variety differing from the typical in the somewhat larger size, smaller number of chambers, typically eight, and a much smoother, less ornamented surface. Diameter up to 1.50 mm.

Holotype of variety (U. S. N. M. No. 371565) from Cooper marl of bluff, west side of Biggin Creek, ¾ mile below Coastal Highway, Berkeley Co., S. C.

CIBICIDES COOPERENSIS Cushman, n. sp. (Pl. 2, figs. 11 a-c)

Test coiled, nearly planispiral in the adult, unequally biconvex, dorsal side slightly convex, deeply umbilicate, both sides almost completely involute, periphery rounded, more broadly so in the later portion, very slightly lobulated; chambers distinct, 7 to 8 in the final whorl, increasing rapidly in size as added, on the dorsal side, with a slight lip along the umbilical end; sutures distinct, somewhat limbate, later ones slightly depressed, earlier ones flush with the surface, gently curved; wall smooth, finely but distinctly perforate; aperture extending from the periphery over onto the dorsal side, somewhat covered by the lip-like projection from the umbilical end of the chamber. Length 0.80 mm.; breadth 0.60 mm.; thickness 0.35 mm.

Holotype (U. S. N. M. No. 371568) from Cooper marl, pit on U. S. Highway No. 17, about 1 mile south of Moncks Corner, Berkeley Co., S. C.

RUPERTIA (?) FLORIDANA Cushman, n. sp. (Pl. 2, figs. 13, 14)

Test attached, elongate, chambers in a loose spire in a column, gradually increasing in diameter toward the upper apertural end; chambers fairly distinct, slightly inflated; sutures fairly distinct, slightly depressed; wall smooth, calcareous, perforate; aperture multiple, in a slight depression of the outer end of the test. Height 2.00 mm.; diameter 1.00 mm.

Holotype (U. S. N. M. No. 371569) from Ocala limestone of Alachua, Fla.

This has many of the characters of *Rupertia,* but further specimens are needed so that sections may be made for comparison with some of the other Eocene forms of somewhat similar structure.

128. A NEW SPECIES OF CLAVULINA FROM THE CRETACEOUS OF TEXAS

By Joseph A. Cushman

In the Journal of Paleontology for December, 1932, Volume 6, page 333, plate 50, figures 1 *a, b,* I referred a species of *Clavulina* to *Clavulina plummerae* Sandidge. In the original manuscript this species was described as new, but while the proof was being corrected Dr. Sandidge's paper appeared and the resemblance between the two seemed to be considerable, and the new name was suppressed and the species referred to that of Dr. Sandidge. Through the kindness of Dr. Sandidge topotype specimens of *Clavulina plummerae* have been examined, and it is at once apparent that the two species are entirely distinct. A considerable series also was received from Mrs. Plummer which further confirmed this fact. Therefore, the Texas species is here named.

CLAVULINA DISJUNCTA Cushman, n. sp.

Clavulina plummerae CUSHMAN (not SANDIDGE), Journ. Pal., vol. 6, 1932, p. 333, pl. 50, figs. 1 *a-b*.

Test with the early portion triserial and trilateral, the sides slightly concave or flat, angles subacute; early chambers of the uniserial portion triangular in section, but the later adult chambers becoming rounded and in side view with a definite tapering form both toward the base and toward the apertural end, the greatest breadth being in the middle zone; sutures distinct, becoming more depressed in the adult chambers; wall arenaceous with a considerable amount of cement, smoothly finished; aperture terminal and rounded in the adult, often with a distinct lip. Length up to 1.50 mm. or more; breadth up to 0.50 mm.

Holotype (Cushman Coll. No. 16299) from the type locality of the Annona chalk near Annona, Texas.

The type figure does not show as many uniserial chambers as often appear, but it does show the characteristic shape of the last-formed chambers which have a very distinct ridge about the chamber, and below the wall is distinctly cut under down to the suture at its base.

This species occurs in typical form in the Upper Taylor, in the Annona chalk, Pecan Gap chalk, and in the Upper Wolfe City sand.

RECENT LITERATURE ON THE FORAMINIFERA

Below are given some of the more recent works on the foraminifera that have come to hand.

Liebus, A.

Die Fauna des deutschen Unterkarbons 3. Teil. Die Foraminiferen.

(Preuss. Geol. Landes. Neue Folge, Heft 141, 1932, pp. 133-175, pls. 9, 10.) *Berlin.*

There are 44 species and varieties described, 2 new.

Silvestri, A.

Revisione di Foraminiferi Preterziarii del Sud-ouest di Sumatra.

(Riv. Ital. Pal., Anno XXXVIII, 1932, pp. 75-107, pls. II-IV.) *Pavia.*

Deals particularly with *Loftusia* and related forms.

Silvestri, Alfredo.

Sulle cosiddette Schwagerine della Valle del Sosio (Palermo). (Boll. Soc. Geol. Ital., vol. LI, 1932, pp. 253-264, pl. VIII.) *Rome.*

Silvestri, A.

Revisione di Orbitoline Nordamericane e Nuova Località di Chapmanine.

(Mem. Pont. Accad. Sci. Nuovi Lincei, vol. XVI, 1932, pp. 371-394, pls. I, II.) *Rome.*

Mostly based on Texas material.

Bogdanowicz, A. and A. Fedorov.

On Some Representatives of the Genus Elphidium of the Sarmatian Deposits of the Lower Kuban River Course.

(50 pages, 1 plate, 34 text figs.)

Published in Russian with English summary, 1932. Nine species and varieties, 2 new.

Protescu, O.

La Microfaune des marnes à glauconie de la region Tintea (Distr. Prahova) et l'importance stratigraphique de l'espèce Clavulina szaboi Hantk.

(Publ. Soc. Nat. Romania, No. 11, 1932, pp. 1-28, pls. 1-4.) *Bucarest.*

Numerous forms figured, 2 new.

Rijsinge, Carel Pieter Isaac van.

Description of Some Foraminifera of a Boring near Bunde (Dutch South-Limburg) with a Discussion of the Theories of Trimorphism and Dimorphism in Foraminifera.

(Octavo, pp. 1-112, pls. 1-4, 4 text figs., 1 chart, 1932. Press of L. Gerretsen, Den Haag.)

An exposition of the theory of trimorphism.

Eisenack, Alfred.

Neue Mikrofossilien des baltischen Silurs. II. (Foraminiferen, Hydrozoen, Chitinozoen u. a.)

(Palaeontologische Zeitschrift, vol. 14, No. 4, Dec. 1, 1932, pp. 257-277, pls. 11, 12, text figs. 1-13.) *Berlin.*

Describes 2 new genera, *Pseudastrorhiza* and *Blastammina.*

Scheffen, W.

Zur Morphologie und Morphogenese der "Lepidocyclinen".

(l. c., pp. 233-256, pls. 9, 10, text figs. 1-6.) *Berlin.*

Alexander, C. I. and J. P. Smith.
Foraminifera of the Genera *Flabellammina* and *Frankeina* from the Cretaceous of Texas.
(Journ. Pal., vol. 6, No. 4, Dec., 1932, pp. 299-311, pls. 45-47, text figs. 1, 2.) *Menasha.*
Describe and figure 16 species, 11 new.

Thomas, Norman L. and Elmer M. Rice.
Notes on the Annona Chalk.
(l. c., pp. 319-329.) *Menasha.*
Numerous lists of foraminifera.

Cushman, Joseph A.
The Foraminifera of the Annona Chalk.
(l. c., pp. 330-345, pls. 50, 51.) *Menasha.*
Records 56 species, many figured.

Cushman, Joseph Augustine.
A Bibliography of American Foraminifera.
(Special Publication No. 3, Cushman Lab. Foram. Res., 1932, pp. 1-40.) *Sharon.*

Scheffen, W.
Die Wertung der Bauelemente bei den Grossforaminiferen.
(De Mijningenieur, No. 12, Dec., 1932, pp. 1-10, text figs. 1-20.) *Bandoeng.*

Sandidge, John R.
Additional Foraminifera from the Ripley Formation in Alabama.
(Amer. Midland Nat., vol. XIII, No. 6, Nov., 1932, pp. 333-377, pls. XXXI-XXXIII.) *Notre Dame.*
There are 43 forms figured, 1 new.

Cushman, Joseph A. and Gerald M. Ponton.
Foraminifera of the Upper, Middle and part of the Lower Miocene of Florida.
(Bull. 9, Florida State Geol. Survey, Dec., 1932, pp. 1-147, pls. 1-17.) *Tallahassee.*
208 species and varieties, 20 new.

Berry, Willard.
The Foraminifera of the Heath Formation of Northwestern Peru, South America.
(Eclog. geol. Helv., vol. 25, No. 1, 1932, pp. 25-31, 2 pls.)
Thirteen species described, all as new. *Basle.*

J. A. C.